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ABSTRACT

This issue, number 42 in the series, is divided into the sections of: (1) British science activities, and (2) overseas and international science activities. Presented in a newsletter format, numerous topics of interest to secondary school science and mathematics educators pertaining to British education are presented. Reports on the engineering profession, school-industry links, technical education, gifted curriculum, zoo education, and various science and mathematics projects under development are presented. The overseas and international section is devoted to news items from the countries of Zimbabwe, Sierra Leone, Gambia, Canada, Malaysia, Wales, and Fiji. Several Unesco projects, international conferences, and international organizations are also discussed. (CS)

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Science Education Newsletter

Issued by the
Education, Medicine and Science Division
The British Council

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

SE 031 753

May 1980

No 42

Contents

Activities in Britain

1 The Finniston Report on the Engineering profession

2 News of school/industry links

3 Scottish Technical Education for Secondary years 1 and 2

4 New Cambridge 'O' level examination in Technology

5 Curriculum enrichment for gifted children

6 The Molecule Club

7 Scottish Schools Science Equipment Research Centre

8 Independent learning in two secondary schools

9 Devon County Council Local Education Authority: Zoo Education Service

10 Schools Council Health Education Project

11 University of East Anglia Seminar: The Structure of Chemical Knowledge

12 Core curriculum for chemistry

13 Concepts in secondary mathematics and science programme (CSMS)

14 Diploma in Mathematics (Teaching)

15 Statistical Education and Training for 16-19 year olds

16 Mathematics for Schools, Second Edition

17 Kent Mathematics Project

18 South Nottinghamshire Project

19 Association of Teachers of Mathematics: annual conference, 1980

20 Schools Council Low Attainers in Mathematics Project

21 Computer education: Syllabuses for the future

22 Pre-service teacher training in computing

23 PUBLICATIONS

Overseas and International Activities

24 Science Education Centre, Faculty of Education, University of Zimbabwe

25 New UNESCO project

26 CASME South Pacific Regional Seminar

27 African Regional Workshop: Science education and the African child

28 A Sampling of the periodicals

29 News from Sierra Leone

30 News from the Gambia

31 News of Canadian Science Education activities

32 Sixth International Conference on Chemical Education

33 Twelfth International Chemistry Olympiad: Linz, Austria, July 1980

34 European Conference on Environmental Education

35 World conservation strategy

36 Energy crisis and environmental education

37 UNESCO: Biology Education Programme for Africa

38 International Mathematical Olympiad

39 Mathematics Competitions in Malaysia

40 1979 Australian mathematics competition for the Wales Awards

41 Fiji Mathematics Association

42 The Gambia Mathematics Teachers' Association

43 Third World Conference on computers in education

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ACTIVITIES IN BRITAIN

1 THE FINNISTON REPORT ON THE ENGINEERING PROFESSION

The Finniston Report 'Engineering Our Future' was published in January of this year. It is the report of the Committee of Enquiry into the Engineering Profession under the chairmanship of Sir Monty Finniston.

The report makes recommendations which affect the provision of education and training programmes, and the recruitment of the right kind of people. The issues are currently being debated, and will be further discussed at a national conference in October initiated by the Secretary of State for Education. They are centring around:

1 The image and status of engineering
2 Subject options in the school curriculum
3 Careers education and advice
4 School-industry links.

The relevant passages on the Finniston Report and comments by the School Technology Forum are summarised in the latter's Report no 19 of March 1980 published by NCST, Trent Polytechnic, Burton Street, Nottingham.

2 NEWS OF SCHOOL/INDUSTRY LINKS

The following news items are taken from Bulletin no 21 of the Schools Information Centre of the Chemistry Industry:

1 The experiences of teachers awarded fellowships in engineering is recounted in a new publication 'Alliance' from:

The Schools Liason Service
Institutions of Mechanical and Electrical Engineers
P O Box 23
Northgate Avenue
Bury St Edmunds Suffolk

2 A 'Summary of links between Schools and Industry Commerce' in the Sheffield area is available from:

The Centre for Science and Technology
Sheffield City Polytechnic
55 Bromgrove Road
Sheffield S10 2NA

3 The Schools Council Industry Project has issued an interim report setting out the background to the project, and progress so far. Available from:

SCIP
29 Maiden Lane
London WC2Z 7JS

4 Science, Technology and Engineering directories have been issued by Avon Science and Technology Centre, New Kingsley Road, St Phillips, Bristol BS2 0LT. A case-study describing the compilation of the directories is available from the School Liason Officer, price £0.65.

5 A 'Computing Organisations Directory for Education' (CODE) lists organisations around Durham willing to give help to schools in computer education. Meanwhile the National Computing Centre seeks to compile a national directory of links between schools and industry in the field of computing.

3 SCOTTISH TECHNICAL EDUCATION FOR SECONDARY YEARS 1 AND 2

The materials produced for this new Scottish course are at present under trial in schools, and plans are being made for publication of the revised editions. It is hoped that publication by Heinemann Education will begin in the summer of 1981.

The course is planned for mixed ability groups, with core and extension work. The latter is of different levels for different ability groups. Thirteen modules of work have been designed of which eight provide the foundation, and the other five are optional. There are three craft modules teaching basic skills in handling wood, metal and synthetics, and a further 'integrated craft' module to enable pupils to combine these materials. The other foundation modules are drawing (two modules) technology (investigation of materials) and craft design (a practical approach to the design process). The optional modules develop these foundations in drawing, technology, integrated craft, and craft design.

4 NEW CAMBRIDGE 'O' LEVEL EXAMINATION IN TECHNOLOGY

The Cambridge Local Examinations Syndicate is offering a new modular syllabus in 'O' level Technology for candidates in Great Britain.

It includes a compulsory section requiring a general understanding of technological systems and of engineering materials and processes, and of the effects of technology on society. Teachers must then select three modules out of seven: structures, pneumatics, mechanisms, electronics or electromagnetics, materials or polymer technology. Candidates will have to answer questions on three of these areas, and solve one problem of a design type which will require a knowledge from the modules. 50% marks will be awarded for an individual project which should consist of 'either substantial constructional work or a practical investigation with a written report'. The project will be assessed by the teachers and moderated by the Board. Detailed guidelines for assessment are given and serve as a framework for the development of the project.

Both the detailed content of the modules and the method of examining are an indication of recent trends in technical education in the UK. They are printed in subject syllabus T(1980) — Syllabuses for Home and Overseas Centres: Technical Subjects, available from:

The Secretary
Syndicate Buildings
17 Harvey Road Cambridge CB1 2EU

5 CURRICULUM ENRICHMENT FOR GIFTED CHILDREN

The project has produced curriculum enrichment programmes, which have been tried out in schools, for each age level from seven to ten (i.e. four units), in each of four curriculum areas: mathematics and science, expressive arts, humanities, and environmental studies. The

programmes are intended for able children, and their construction reflects both breadth and depth in learning. Each programme comprises a set of activities which might form a term's work, but it is hoped that pupils will proceed at their own rate. The kits include tapes and slides, as well as written material.

The units are based upon the known interests of outstandingly able children, and in order to enable teachers to relate particular units to individual children each unit has been assigned a criterion reference level by including examples of the most outstanding work resulting from the given activity.

The units have been devised by small teams of teachers and college of education lecturers. After an initial pilot phase limited to the participating schools, a wider programme of testing and evaluation was undertaken.

Readers of SEN may be interested in the following kits:

1 Making Changes — Mathematics

This unit is designed to teach the child coordinates, use of graphs, loci, mirror images, volume to surface area, rotation and transformations. The child's activity id directed by cassette and worksheets and the pupil's book provides information on experiments which the child can undertake.

The game of swimming enables the child to practise and extend his understanding of the concepts gained from the project. The set includes a thick plastic mirror for work on transformations and mirror images.

Student Books — 2 copies
Teachers' Guide
Tapescript
Cassette
Game
Pressurefax Worksheet Masters
Perspex Sheet
Complete Kit £29.95

2 Living Things — Environmental Science

The aim of this unit is to teach the child the concepts of scientific investigation based on experiment, observation of plant and animal life and the logical interpretation of facts. The subject matter includes the classification of animals and plants, ecosystems, environmental adaptation and seasonal variation. Activities suggested can be carried out both in classrooms and in the field.

Student Books — 2 copies
Teachers' Guide
Pressurefax Worksheet Masters
Slide Set
Slide Viewer
Complete Kit £27.50

Published by:

Globe Education
Houndmills
Basingstoke RG21 2XS

6 THE MOLECULE CLUB

Since April 1967 the Molecule Club has been staging theatrical performances with scientific themes for children of 7—11 years. The club, which is a branch of the Mermaid Theatre, has tried to show that science and its applications are part and parcel of everyday life and not merely laboratory exercises. The presentations are visual demonstrations of scientific phenomena often set in a traditional dramatic performance. For example 'Sparks!' is a Victorian melodrama in which the villain tries to use the devilish 'magic' of electricity for mischievous purposes: but the heroine sets out to discover what this 'magic' is and by trial and error learns about Circuits, Conductors and Insulators and manages to make a simple battery, finally outwitting the villain with some dramatic electrical tricks of her own.

Other Molecule Club performances have dealt with sound, light, mechanics, the motor car and magnetism. Further information is available from:

The Mermaid Theatre
Puddle Dock London EC4V 3DB

7 SCOTTISH SCHOOLS SCIENCE EQUIPMENT RESEARCH CENTRE

This Centre has been giving advice on science equipment to Scottish schools since 1965. It is controlled by a Governing body elected from the Scottish LEA's who finance it in proportion to their secondary school population.

The work of the Centre is divided between testing and development. Equipment which is submitted to the Centre is examined and a report is sent to the manufacturer for comment. The report, with these comments, is filed at the Centre and is available to Scottish teachers. In addition to this work, apparatus designed by teachers can be assembled, tested and modified at the Centre.

Advice is offered personally in the display laboratory and at exhibitions mounted outside Edinburgh, or through the Bulletin which is published at approximately 6-week intervals. It contains notes on different items of equipment, how to use them effectively and the purposes to which they can be put in teaching. It includes Safety Notes, and Trade News, and a section entitled 'In the Workshop' with detailed instructions for the assembly of equipment in the school workshop. The Centre has recently run two-hour workshops, one for school laboratory maintenance and repair, and the other on building integrated circuits.
The Bulletin is available to overseas readers who should send £1.00 by cheque or international postal order to:

The Director, SSSERC,
103 Broughton Street
Edinburgh Scotland EH1 3RZ

8 INDEPENDENT LEARNING IN TWO SECONDARY SCHOOLS

In the latest issue of the ILIS newsletter details are given of the organisation of independent learning schemes in two secondary schools — for mixed ability pupils in years 1 and 2 for Science, and in years 3 to 5 for Physics.

For the Science course both classwork sheets and homework sheets have been designed. There are extra, differently numbered sheets of both sorts for the more able, requiring more advanced interpretation or skills. There are also extra sheets for fast working pupils of

average ability, which do not require more advanced skills. The least able are directed to the 'key' worksheets only, so that they are able to move on to other topics. A tray of equipment for each experiment is issued by the laboratory assistant from the 'prep' room, and includes a list of the equipment. The pupil gives in his name-card in exchange and in this way petty theft and carelessness are minimised. Books for homework are borrowed on the same basis. Pupils do the same 25 item multiple-choice test at both the beginning and the end of a topic.

For the Physics course, the worksheets are divided into Note, Experiment, Problem and Test Sheets, and are numbered and colour coded for difficulty. A minimum of writing and drawing is required in class, but project-type homework is set and books can be borrowed for it. Pupils engaged in written work sit at the four island benches, while practical work is performed at the benches against the walls. Equipment ordered by the teacher is put out on 4 trays and stored in a cupboard in the laboratory until used. It is then distributed from the four island benches. Each topic is presented in a 'schedule' which lists the worksheets and notes their level of difficulty. It also acts as a record the pupil's progress and marks.

More information about the organisation Independent Learning in Science can be obtained from:

The Secretary
Mr Eric Green
Countesthorpe College
Winchester Road
Countesthorpe Leicester LE8 3PR

9 DEVON COUNTY COUNCIL LOCAL EDUCATION AUTHORITY: ZOO EDUCATION SERVICE

Resource services such as those provided by the zoo occupy a niche somewhere between the Teachers' Centre and the classroom. One advantage is that in a service such as this, the staff have an opportunity to meet and talk with a very wide cross-section of the teaching profession. Many teachers accompany groups who would not, perhaps, initiate visits themselves. Having experienced all that the zoo service can offer, they continue to use it of their own accord.

Paignton Zoo Education Service teaches between 10 and 15,000 children each year in the course of the Day Visit programmes. In addition residential courses of varying duration are also organized. During the course of planning these visits there is opportunity for the zoo staff to suggest new topics and exciting themes of study and thus to play some part in curriculum-development. Similarly, there is an element of In-Service training as teachers take part in the introductory work which is carried out with the children before and during their visits to the plant and animal collections. Zoo education staff are also able to play some part in co-ordinating resource usage by suggesting to teachers that certain other materials are available or that a visit to one particular museum would provide a useful 'follow up'. At the same time, the Zoo Education Service is striving to build up its own collection of loan materials to supplement those available from other sources.

Finally, the Zoo Education Service is involved in many In-Service courses held by County Advisers in such fields as Mathematics, Science, Art and Craft, Drama and Home Economics. In addition single sessions and courses are run through local Teachers' Centres. These are aimed at enabling teachers to use the collections when the education staff are fully booked or when teachers feel that it would be more satisfying to teach the children themselves. The zoo is a very difficult place in which to teach and every possible method is employed to give teachers the confidence to use one of the most stimulating of educational resources.

10 SCHOOLS COUNCIL HEALTH EDUCATION PROJECT

The project teams have worked on the assumption that in the UK health problems are no longer chiefly due to the spread of infections diseases but to self-inflicted damage such as cancer, heart disease, accidents, mental illness and so on. In consultation with teams of teachers they have produced teachers' guides for the 5—8 year-olds 'All About Me' and for the 9—13 year-olds 'Think Well'.

'All About Me' has the chapter headings:

Finding out about myself
How did I begin
What is growing
What helps me grow
Looking after myself
Keeping safe
Knowing about others.

'Think Well' comprises eight units:

Myself (self concept, sexual development)
One of many (relationships, responsibilities)
From sickness to health (environment and health)
Deadly decisions (smoking, drugs, alcohol)
Time to spare (exercise, rest and leisure)
Food for thought (nutrition and food hygiene)
Get clean (hygiene, dental and foot health)
Skills and spills (safety)

The project team has also produced video-recordings to introduce the materials to teachers and give in-service training. This work of dissemination has continued in a second phase of the project from 1976—1980.

Meanwhile further project funds have been allocated to adapt the materials for teachers of slow-learning pupils. This Special Education Extension has produced its first newsletter outlining the relevance of the project materials to slow learners. Information on this and the dissemination of the 5—13 project is available from:

SCHEP
24 Harold Road
Clacton-on-Sea
Essex

Members of the team have also been closely associated with the ATV series for schools 'Good Health' (for 8 years olds and above). The programmes are available on 16 mm film. ATV have shown another series 'Alive and Kicking' for 6 and 7 years olds. Also a BBC Radio 4 series 'Exploring Society' has relevance to 'Think Well'.

In 1977 SCHEP 13—18 began work on the development of teachers' guides in areas where existing resources

were inadequate. Draft materials for teachers and pupils of 13—18 years are being tested in schools on the following topics:

changes of puberty
life-style and health
road safety
smoking
peer-group pressures
alcoholism and VD
eating habits
dental health
coping with accidents
a beginners' guide to the health services.

Further information can be obtained from Trefor Williams at the Colchester Institute of Higher Education until September, and then at the Department of Education, University of Southampton SO9 5NH.

'All About Me', price £3.25 and 'Think Well' price £12.00 are published by Thomas Nelson & Sons Ltd.

11 UNIVERSITY OF EAST ANGLIA SEMINAR: THE STRUCTURE OF CHEMICAL KNOWLEDGE

We have just received the report of the second Chemical Education Seminar, held at the University of East Anglia in July 1979. On this occasion 30 eminent chemists from 10 countries were invited to discuss aspects of 'the structure of chemical knowledge'. During small group discussions and plenary sessions two distinct views of this structure emerged. One focussed on the logical relationships between the facts and concepts of chemistry itself — which might be seen as the 'experts' view of a topic, based on his experienced oversights of its elements. The other view was concerned more with the psychological structure of the chemical topic. This latter may be seen as the learners' viewpoint or the routes and relationships by which a student becomes familiar with the chemical concept.

Both views of chemical structures were seen as valuable, in chemical research for prediction, for teachers and curriculum planners in preparing and teaching material, and for students in helping them to structure their knowledge and so understand it more fully.

Various methods of representing structures — trees, matrices, tables, and Venn diagrams, were also discussed at the seminar.

12 CORE CURRICULUM FOR CHEMISTRY

The Chemical Society and the Royal Institute of Chemistry have expressed concern that the chemistry content of the syllabuses being taught to pupils up to the age of 16 is diminishing. They point out that there must be sufficient chemistry taught at this stage to kindle enthusiasm for its study at 'A' level and beyond. They have suggested an irreducible minimum for the chemistry component of such syllabuses, which includes:

1 pure substances, elements and compounds
2 properties of metals and non-metals
3 chemical change
4 air and combustion
5 hydrogen and its compounds, including water
6 fuels
7 diffusion
8 occurrence, availability and extraction of common metals
9 acids, bases and salts
10 at least one industrial process
11 properties and uses of everyday substances
12 chemistry of living systems
13 chemical hazards

It is intended that these basic ideas should be developed in different ways according to age, ability and needs of the pupils. The full recommendations are contained in a memorandum available from:

Mrs E S Wellingham
The Chemical Society
Burlington House
London W1V 0BN

13 CONCEPTS IN SECONDARY MATHEMATICS AND SCIENCE PROGRAMME (CSMS) (SEN 37:1)

CSMS has produced a set of diagnostic tests for assessing the ability of children (or adults) to use 'concrete and formal reasoning strategies', called CSMS: Science Reasoning Tasks. There are 7 tests:

1 Spatial Relationships
2 Volume and Heaviness
3 The Pendulum
4 Equilibrium in the Balance
5 The Inclined Plane
6 Chemical Combinations
7 Flexible Rods

These tasks have been fully tested for validity and reliability and have a precision comparable with conventional psychometric tests. They can be used by science teachers without professional training in Piagetian studies and a class of 30 pupils can be tested on each task in 35—50 minutes.

A specimen set of the tests and all necessary instructions for their use are available to researchers, from the National Foundation for Educational Research,for £6.50. There is a General Guide, written by Hugh Wylam and Michael Shayer (research fellows, Chelsea College, University of London), price £2.50, describing the use of the test.

Readers wishing to learn more about the Concepts in Secondary Mathematics and Science Programme can obtain a booklet describing the work of the project from:

The Director CSMS
Centre for Science Education
Bridges Place
London SW6

14 DIPLOMA IN MATHEMATICS (TEACHING)

In the late 1950's there was an acute shortage of teachers of mathematics so that many who were not adequately qualified in the subject were in fact having to teach it: some to G.C.E. 'O' level and some beyond that. The Mathematical Association therefore, for the first time in

its history, decided to act as an examining body and launched the Diploma in Mathematics which a year or two later had the word 'Teaching' added in brackets. The first examination was held in numerous centres all over Great Britain in 1961. At that first examination over 100 teachers sat for the examination and 50 were awarded Diplomas. The numbers grew each year and began to include candidates from overseas e.g. Hong Kong, Nigeria, Ghana, the Sudan, Solomon Islands & Fiji. By 1978 the original aim of the Diploma had been largely satisfied so the last examination was held in November 1978 for those who had been referred in one of the papers at a previous examination. The new Diploma in Mathematical Education awarded by the Mathematical Association was first announced in SEN 34: 12.

During the 17 years that the examination had been held nearly 800 teachers had been awarded a Diploma and a number of these had taken a more advanced paper in Statistics, or Applied Mathematics, or Numerical Methods and had their Diploma endorsed accordingly. As the pass rate was usually between 40% and 50% it means that almost 2,000 teachers had followed a course for the Diploma and thereby improving their own knowledge of mathematics although not gaining a Diploma. The Diploma was, and still is, recognised by the Burnham Committee as qualifying the holder for an increment in salary as a teacher, whilst those who hold the Diploma together with one Endorsement automatically qualify for the Licentiate of the Institute of Mathematics and Its Applications should they so desire.

In the first few years the emphasis was on what is now known as 'Traditional Mathematics' but the syllabus was changed gradually with the change in mathematical thinking and teaching so that in the latter years the emphasis was on 'Modern Mathematics'.

15 STATISTICAL EDUCATION AND TRAINING FOR 16—19 YEAR OLDS

This report from the Centre for Statistical Education discusses O and A level GCE examinations and further education courses in statistics. It also covers teacher training, publications and curriculum development. The report includes a summary and lsit of recommendations. Copies at £1.95 (including postage) can be obtained from:

The Department of Probability and Statistics
Sheffield University
Sheffield S3 7RH

16 MATHEMATICS FOR SCHOOLS, SECOND EDITION

This was first reviewed in SEN 27: 18. Materials for ages 5—7 years are published as Level I and those for the age range 7 — 13 years as Level II. The second edition incorporates feedback from teachers who have been using the materials. Inspection sets can be purchased as follows:

Level I (with Parents' booklet),	£9.85
Level II Books 1—2	£5.76
Level II Books 3—4	£5.76

from Addison-Wesley Publishers Ltd. Level II Books 5—10 will follow.

17 KENT MATHEMATICS PROJECT (SEN 37: 2)

The KMP materials for very slow learners, sponsored by the Schools Council, are now available in addition to the first 4 of 9 levels. Some teachers have not realised that the main sets of materials are for almost the full ability range.

A survey has been made of the KMP levels achieved by children of different ability at different ages. The 'average' pupil completes levels 1—5 by the age of 16 whereas a good 'O' level candidate completes 8 levels by that time. Level 9 is intended only for exceptional pupils who would be capable of beginning 'A' level work by the age of 16.

'Very slow learners' are assumed to have both language and mathematical difficulties and may achieve skills up to level 3 by that age. The L-level 1—3 materials for these pupils contains some of the work covered in levels 1—3 introduced in modified form — the language, presentation, content and learning gradient have been carefully adapted in order to ensure the success and so enhance the motivation of the slow-learner.

KMP L-level materials are published by Ward Lock Educational at £58.00 per set L1, L2 and L3 or £144 for the three. Each set includes workcards, cassettes, teachers' guide, pupil books and concept network/matrix records. Sufficient for 60 pupils.

18 SOUTH NOTTINGHAMSHIRE PROJECT (SEN 35: 4)

Stages 1 and 2 for secondary years one and two are now published by Blackie and Sons.

Work is currently proceeding for the 13—16 age range. There is particular emphasis on algebra, a branch of mathematics which often provides particular conceptual difficulties for pupils of average and below-average ability. Working with mathematics teachers in a group of South Nottinghamshire schools, the writing team is developing a variety of new methods of introducing basic algebraic concepts and techniques. Materials are in the form of loose-leaf teachers' guides and it is possible that they will be published commercially in due course.

Enquiries should be addressed to:

Dr Alan Bell
Shell Centre for Mathematical Education
University Park
Nottingham NG7 2RD

Various research reports deriving from the work of the project are also available.

19 ASSOCIATION OF TEACHERS OF MATHEMATICS, ANNUAL CONFERENCE, 1980

The conference took place at the West Sussex Institute of Higher Education, Bognor Regis, from 9th — 12th April. Among nearly 300 participants were a number from overseas countries including Australia, Belgium, Canada, Denmark, India, Italy, Kuwait, Netherlands, New Zealand, Sierra Leone, Switzerland, USA and Zambia.

As is usual with ATM conferences, much of the time was taken up by working groups, small discussions and workshops. Considerable discussion took place about current trends in mathematics education in Britain. Two themes predominated. First was an acute awareness that there is no quick and simple way of raising the standards of school mathematics teaching, combined with some concern that the Cockcroft Committee (see SEN 38: 11) due to report in late 1980 or early 1981, might not reflect this complexity in their recommendations. Secondly, a reappraisal of the place of professional subject associations was thought to be timely, in view of the tendency towards increasing control in curricular matters from above! This tendency is not one that is welcomed by the Association.

Next year's conference will take place at St Martin's College, Lancaster from 13th — 16th April, 1981.

20 SCHOOLS COUNCIL LOW ATTAINERS IN MATHEMATICS PROJECT

The mathematics committee of the Schools Council set up a sub-committee to look at slow learners in mathematics and to recommend what work should be done in this field. They visited a number of schools and made these recommendations for further work:—

a) Organisational choices within schools (e.g. responsibility with mathematics or remedial department; withdrawal system, remedial classes or float teachers, etc.)

b) Curricular choices (balance between computation skills/social applications/mathematics; aims for 16+ leavers, etc.)

c) Teaching and learning (gaining insight into how pupils grasp ideas and why they fail; effective teaching approaches, etc.)

d) Selection and diagnosis (better ways of selecting pupils for remedial action and of diagnosing specific difficulties)

e) Teacher training (in-service and pre-service, within schools and by outside agencies).

f) Teaching materials (guides to available resources, books for teachers, pupil materials, etc.)

Schools Council felt that, in the first place, a more detailed look should be taken at current practice. A steering committee was formed to supervise what it was hoped would be a rolling programme of work in the above areas. The present project is in two parts:

i) Literature Search: a review which would make some of the research literature relevant to the teaching of mathematics to low attainers accessible to teachers.

ii) Main Project: will produce a report written for teachers, heads of departments, heads and deputy heads in primary, middle and secondary schools and local advisers, dealing with many aspects of teaching mathematics to low attainers in the 5—16 age range.

The project is about half way through its term of eighteen months: it is due to finnish at the end of 1980. Publications will, it is hoped, be in late 1981. Part (i) of the project is being undertaken by two part-time research assistants. Part (ii) is staffed by two full-time workers.

Initially the main project team made a number of informal visits to schools.

From the initial informal visits the project team felt that low attainers in mathematics could not be regarded in isolation from the rest of the school. Consequently the visits were not restricted to the low attainers but tried to look at these pupils in the context of the whole school.

The project team became aware of these particular areas of importance:

a) to define which pupils are low attainers in mathematics.

b) The different philosophies relating to the teaching of mathematics to low attainers.

c) The causes of low attainment, specific problems affecting attainment and needs of low attainers.

d) The organisation within school and classroom; factors which affect the organisation and implications of the organisation.

e) The ways in which pupils may grasp concepts and develop skills: teaching techniques.

f) Courses and materials: objectives, criteria for selection of content, criteria for selection of materials and relationship of materials to courses.

g) Methods of assessment, ways in which results of assessment can be used to plan pupils' work and evaluate teaching strategies. Recording progress/ continuity.

h) Identification and selection of low attainers in mathematics: the implications of selecting and not selecting.

i) Ways to implement change within a school.

j) Sources and resources for the teacher.

k) Implications for further work.

It is envisaged that these points will form the framework of the report.

As a result of the visits the project team felt that further work should be carried out in in-service teacher training, teaching strategies and assessment techniques.

21 COMPUTER EDUCATION: SYLLABUSES FOR THE FUTURE

A working party of the Schools Committee of the British Computer Society has recently produced a list of topics whch they consider to be of lasting value, or of relevance for the next decade in computing studies. They recommend 'that the topics be included somewhere within the normal secondary school curriculum for every student either as part of a computing course or as topics studied within other subjects eg. general studies, humanities or mathematics'. The list of topics with some suggestions as to how they might be presented is published in Computer Education no 34, obtainable price £1.00 from:

North Staffordshire Polytechnic Computer Centre
Blackheath Lane
Stafford ST18 0AD

22 PRE-SERVICE TEACHER TRAINING IN COMPUTING

A working party of the British Computer Society Schools Committee has designed a five-hour course intended for all student teachers. They suggest that it should be regarded as a component of Professional Studies, or of Educational Studies, or of General Studies.

They point out the need for all teachers to have some understanding of computing since they work in a system which is increasingly using computers for administrative purposes, and teach children in a society which is making increasing use of them.

The course they have outlined aims both to provide a foundation for more detailed studies and to make students aware of the capabilities, limitations and social implications of computers. Their suggestions are published in Computer Education no 34, price £1.00, available from:

North Staffordshire Polytechnic Computer Centre
Blackheath Lane
Stafford ST18 0AD

23 PUBLICATIONS

23.1 Aspects of Secondary Education in England: A survey by HM Inspectors of Schools, from the Department of Education and Science, published by HMSO 1979 at £6.75

This is a substantial and informative report of a survey carried out by Her Majesty's Inspectors from 1975 to 1978. It provides an account of what English schools are offering, and the ways in which pupils are responding in the fourth and fifth years of secondary education. The survey was organised as a series of inspections of a sample 10% of all types of secondary school of all age ranges (excluding of course sixth form colleges and middle schools). The inspections concentrated on the development of language skills, the development of mathematical understanding and competence, the development of scientific skills and understanding and on the personal and social development of pupils and the preparation they receive for adult living; and the report devotes a separate chapter to each of these aspects.

Readers of SEN are likely to be particularly interested in the chapters on mathematics and science; the topics listed in these chapters are:

Mathematics

Assessment of mathematics in the survey — mathematics in the curriculum — types of courses — some aspects of content — accommodation and material provision — teaching approaches and pupil responses — organisational aspects of the mathematics department — links with other subjects — staffing — summing up.

Science

Place of science in the curriculum — pupils taking science — character and content of courses — science and other subjects in the curriculum — extra-curricula activities — accommodation and resources — staffing — organisation and work of science departments — teaching style — assessment and evaluation — general summary of provision — response of pupils — general summary of 'response' — general discussion of main findings and issues — annex: assessments related to uptake of Nuffield project.

23.2 Cooperation between Science Teachers and Mathematics Teachers, published by the Institut für Didaktik der Mathematik der Universität Bielefeld, 1979

This book of 589 pages gives a detailed account of the proceedings of a conference held at Bielefeld from September 17—23, 1978. The conference was jointly organised and sponsored by UNESCO, the Committee on Teaching of Science (of the International Council of Scientific Unions — ICSU), the International Commission on Physics Education (ICPE), the International Commission on Mathematical Instruction (ICMI) and the Institute for the Didactics of Mathematics (IDM).

This weighty tome is excellent value and is highly recommended to all those involved in the teaching of science or mathematics. All the plenary papers have been reproduced together with other papers prepared for the conference; also reports of the 5 working groups have been included.

Plenary papers and their authors are:

'Application of Mathematics in, and with, Sciences' by Sir James Lighthill, Cambridge.

'The Role of Mathematics in Physics' by Charles Taylor, Cardiff.

'Some Thoughts on the Coordination Between Education in Mathematics and Education in Physics' by A Revuz, Paris.

'Mathematical Skills Used in Science: Their Nature and Acquisition' by Uri Haber-Shaim, Boston.

'Elementary Applications of Information Theory in various fields of Science and Technology' by Roman U Sexl, Wien.

'Mathematical Models in Population Biology: Interaction Between Mathematics and Science Curriculum' by K P Hadeler, Tubingen.

The topics considered by the working groups were:

'Science Applications and Model Building as Part of the School Curriculum'

'Implications of Mathematics in the Physics Classroom'

'Mathematics in the Biology Classroom'

'Mathematics in the Chemistry Classroom'

'Conditions for Cooperation and Strategies for Innovation'.

23.3 Understanding of non-technical words in science: A research Report written by J R T Cassels and Dr A H Johnstone, on behalf of the Education Division of the Chemical Society and published by the Chemical Society 1980 (price £5.00 to non-members, £2.50 to members).

This research investigated students' understanding of non-specialist words which are often used in science such as *reverse, inert, coincide, valid, substitute,* and so on. During 1977/78 51 words which had proved to be

difficult in a previous survey were tested with higher education students (including teachers in training in Britain and the West Indies). Lists are given of words which were correctly understood by fewer than 80% of different groups of these tertiary students. In a separate exercise some 500 words were tested with 15,000 pupils from the whole range of secondary education in the UK and results from the secondary school survey were used to devise a new exercise in 1978/79. The 160 most difficult words were tested with a new sample of 10,000 secondary pupils. In this phase teachers were asked to devise their own test questions for the words, given some examples and guidance. This meant that each word was tested in a variety of contexts and this proved to have a remarkable effect on the ease with which they were understood. For instance, when the word 'liberate' was presented in this sentence: 'The new ruler decided to liberate the prisoners', 60% of first year pupils understood it. However, only 16% understood the same word in this sentence: 'Hydrogen was liberated when magnesium was added to acid'.

The authors provide a detailed analysis of factors which contribute to difficulty in word understanding, which include:

Connotation (whether the word has a familiar or special meaning),

Context,

Confusion (if the word sounds like another word with a different meaning).

Although it is apparent from the examples that some of the test items are weak and the authors' Ausubelian concluding explanations for difficulties seems rather forced, this report makes most illuminating reading for anyone concerned with science education. It provides invaluable insights into a source of difficulty pupils have to grapple with in science, over and above the conceptual difficulties of the subject itself, and into steps that we can take to help them through it.

23.4 PANDA, published by SOMA Printing and Publishing House, South Africa

Those involved in education in Southern Africa will find it well worth reading PANDA, the mathematics and science section of The Secondary & High School Students Digest of Southern Africa, published in South Africa. The magazine is a private venture published and edited by Manakane Mabogoane who has established the SOMA Printing & Publishing House. PANDA is produced with the approval of the South Africa Department of Education and Training and carries articles and letters on a wide range of subjects: mathematics, science, general educational issues and careers guidance. It costs only 50 cents (South Africa) per copy and subscription details may be obtained by writing to:

The Students & High School
Students Digest of Southern Africa
Box 90
PO Kwa Thema
via Springs 1563
South Africa

23.5 Start Finding Out, Pupil's book standard 5, by Beryl Kendall, published by Longmans Group Ltd, 1979, available from:

Longman Kenya Ltd
PO Box 18033
6th floor Kenya Commercial Bank
Industrial Area
Nairobi, Kenya.

105 pages of attractive text with large clear drawings and the intelligent use of colour all go together to provide an attractive presentation from the young students point of view.

The content does in fact consist of familiar topics such as air, weather, soil etc which all utilise plant, animal and manufactured resources which are easily obtainable in the typical rural African environment.

The printing itself is in large clear type and together with the simple sentence structures utilised, makes the book well suited to easy reading by the age group in classes at the top of the African primary school.

Some exercises are provided for exploitation by the teacher and generally speaking the clear descriptions do not detract from the motivating aspect of this useful text.

23.6 Science Education for Progress — A Caribbean Perspective, published by ICASE 1980, at $6.00 or £2.75

This 150 page report of a Regional Conference held in Barbados in April 1979 is now available. It contains the texts of the 4 plenary sessions, the speech by the Hon. L R Tull, Minister of Education and Culture and the closing address given by Mrs Sheila Haggis of UNESCO. There are reports of the 7 concurrent discussions sessions and posters sessions, an evaluation of the conference and a list of participants.

The Conference was sponsored jointly by ICASE, CROASE, UNESCO, NSTA and the British Council.

Copies are available from:

ICASE Executive Secretary
The British Council
10 Spring Gardens London SW1A 2BN

23.7 Prospects: The Quarterly review of education, vol IX no 3, 1979 published by UNESCO

This issue of 'Prospects' will be of particular interest to those concerned with the teaching of mathematics. Some 47 pages is devoted to articles by eminent mathematical educators who consider some aspects of the general theme 'mathematics for real life' on topics of relevance to the current debate on the kind of mathematics required in schools.

23.8 Teaching Science: an annotated catalogue of a book exhibition, published by the National Book League, 1979, at £1.70 to members and £2.00 to non-members.

Nearly 400 books are catalogued in the following main sections: Astronomy, Biology, Chemistry, Geology, Physics, Physical Science, Science and Laboratory Management and Safety. Where appropriate the sections are further divided by level: middle and lower secondary

(9—13 years), CSE and 'O' level (13—16 years), 'A' level. There is a reference section for each of the major subjects. The bibliographic information given includes author, title, publisher, date, price number of pages and ISBN number. The catalogue contains a list of publishers' addresses. It is available from:

The National Book League
7 Albemarle Street London W1X 4BB

23.9 A new tropical health science for West Africa, by P S Samuel, and others, published by Macmillan 1979 at £2.50.

This book has the advantage of a large format permitting profuse illustration by line drawings and photographs, of West African origin. A large typeface allows for reading clarity, and the language has a style common in West African classrooms.

The subject matter covers the Health Science syllabus for the West African Examinations Council GCE and School Certificate Examination. Although there are not a great many instructions for practical work, the text presents a relevant ecological approach. It emphasises cause and effect in health and disease, both mental and physical, as encountered in West Africa.

The authors have included short descriptions of the lives of prominent West African medical men — a welcome innovation in a well presented text.

23.10 Intermediate Physics by J W Hill, published by Macmillan Education, 1980 at £2.50.

This book provides a traditional approach to physics leading to certificate examinations at the age of 16+ in British schools. The text which is condensed within 228 pages in 23 chapters is written in a concise and straightforward manner.

The book does not contain practical work but does include worked examples on aspects of physics that require quantitative treatment. SI units are used, with the addition of some imperial units which are deemed more suitable for school work at elementary level.

23.11 Structured questions in chemistry by A L Barker and K A Knapp, published by Macmillan Education 1979, at £0.95.

This volume is a companion to the authors' 'Chemistry — a practical approach' and the chapter headings are arranged to correspond with that book.

The questions test recall of knowledge, comprehension and higher thought processes which are not classified. They are often presented in stages and mark allocations for each step are provided.

The items were pre-tested in three schools. They cover most of the topics found in a typical 'O' level chemistry course.

23.12 Think chemistry by C Windridge published by Schofield and Sims 1979, price £0.55.

This is a short book of 1000 questions of the simple recall type. They are designed to increase the factual knowledge of chemistry students in the age range 13—16 years. The questions are grouped under 50 headings and would be useful for oral use (many can be answered in one word) by the teacher or for a consolidation exercise at the end of a topic.

The other books in the series, price £0.55 each are: Think Biology, Think Physics and Think Science.

23.13 Action Chemistry Series, published by the Book Society of Canada, and in the UK by John Murray, 1980.

All the texts were originally prepared in Canada and so much of the illustration has a Canadian orientation but the originality in presenting the text and the constituent experimental work would suggest their use as a source of enrichment material and project work for 'O' and 'A' level studies.

Four of the modules in the series are available:

Water, chemistry and ecology
includes a detailed chemistry of hardness in water, detergents, a qualitative treatment of oxygen in water, respiration and photosynthesis, industrial pollution, fertilisers, plant cultures and biochemical oxygen demand.

Chemistry of photography
The basic chemistry of film emulsions and the latest image development including colour photography are given a practical treatment. Another chapter details the function of a camera and there follows a more detailed treatment of darkroom developing techniques and camera techniques.

Chemistry of the car
describes the chemistry of the operation and ageing of a car and the car manufacturing process. Individual chapters deal with the chemistry of oil, the combustion process and corrosion, giant molecules exemplified by rubber and pastics, lubricants and viscosity.

Chemistry of metallurgy provides a basic knowledge of how metals are extracted and refined, together with their use for a variety of purposes. The book begins with a practical treatment of metal extraction processes for iron and copper, and a description of the uses of nickel, zinc, lead and aluminium. The consideration of alloys leads to a treatment of phase diagrams for miscible and immiscible metal systems. There follows a section dealing with the tratment and testing of metals and corrosion of automobiles.

OVERSEAS AND INTERNATIONAL ACTIVITIES

24 SCIENCE EDUCATION CENTRE, FACULTY OF EDUCATION, UNIVERSITY OF ZIMBABWE

This Centre has been functioning since 1970, teaching courses relating to science education which are now part of the BEd, the Graduate Certificate in Education and the MEd offered by the Faculty. Its staff have been engaged in research in science education, in curriculum development, and in fostering science teachers' activities.

The new Republic of Zimbabwe is expected to need more young people well qualified in scientific and technical subjects, and there is a need to improve the achievement of school leavers in science subjects and to provide more secondary school science teachers. To meet this need the Science Education Centre has formulated the measures outlined below, and is seeking funds and personnel to implement them.

Reinforcement of Secondary School Science Teaching

(a) Teaching XYZ

A series of pamphlets for teachers where XYZ are those topics science teachers find particularly difficult to teach successfully: authors to include serving teachers, teacher trainers and members of the Faculty of Science, University of Zimbabwe.

(b) Mobile Science Teachers' Centre

A custom built vehicle with a tutor to provide on-the-spot in-service training of small groups of science teachers: equipped with XYZ and ZeSTT materials, an audio-tutorial carrel, textbooks, teaching schemes and apparatus.

(c) Graduate Certificate in Education (Science)

To introduce Grad.C.E. (*Science*) to enable science graduates to follow a professional course with more emphasis upon science and science education than is possible in the present Grad.C.E. course.

Provision of more Science Teachers

Certificate in Science Teaching

An emergency programme for producing junior secondary/O level science teachers who minimally hold prescribed Junior Certificate qualifications or equivalent qualifications in technical fields or nursing.

A prerequisite of this programme would be the production of an *independent learning school science course.* Students reading for the Certificate would be trained to use the course effectively. Successful students, after a satisfactory period of teaching in schools, would be eligible for admission to a College of Education.

It is envisaged that the independent learning materials would also be of value in reinforcing science teaching generally.

Enquiries should be addressed to:

The Director
Science Education Centre
University of Zimbabwe
P O Box MP 167
Mount Pleasant
Salisbury
Zimbabwe

25 NEW UNESCO PROJECT

A new project initiated in 1979 is entitled 'Adapting education in science and technology to a changing society and to the diversity of needs of Member States'.

As the first stage, studies will be carried out and information collected, on ways of making science education more relevant to the diversity of needs of the Member States. Every effort will be made to ensure that all regions of the world and a diversity of social systems will be covered. Without neglecting a consideration of today's needs, attention will also be given to the needs that will arise within the working life-time of the students.

The second stage will involve a review of these studies and the preparation of guidelines for future action. 'It is hoped that from these studies ideas might emerge as to how to help the citizens of the next generation to be better prepared for living under the conditions they will find: for becoming agents of change, modernisation and improvement; and for facing life more confidently and with more self-reliance.

Readers wishing to make contributions to this project (bibliographic information, anthologies, analysis of the needs in their part of the world, case-studies etc) may send them to:

The Director
Division of Science, Technical and Vocational Education
UNESCO
Place de Fontenoy
75700 Paris
France

26 CASME SOUTH PACIFIC REGIONAL SEMINAR

The fifth in the series of Commonwealth regional seminars concerned with the relevance of science and mathematics education was organised by CASME (the Commonwealth Association of Science and Mathematics Educators) in collaboration with the Australian Northern Territory Department of Education. It took place in Darwin from 10th—14th March 1980. Funds for international participation were provided largely by the Commonwealth Foundation, supplemented by a grant from the Commonwealth Fund for Technical Co-operation (CFTC).

Under the title 'Teacher Education for National development', the conference considered the problems and opportunities specific to countries of Australasia and the South Pacific region in the training of science and mathematics teachers. The programme and copies of plenary papers and discussion group reports are available from:

The Secretary of CASME
Mr E Apea
Education Division
The Commonwealth Secretariat
Marlborough House
London SW1

As well as from Australia, participants came from Fiji, India, New Zealand, Papua New Guinea, Singapore and Tonga. In addition a few members of the CASME Council were present from Ghana and Britain.

The key-note address was given by the distinguished Australian scientist, Sir Mark Oliphant FRS., whose lively contributions to discussions of the other plenary papers were also much appreciated. Discussion groups provided the usual opportunities for interaction between partici-

pants, and it is hoped that these deliberations will lead to further regional action, perhaps in the form of small-research type projects on new techniques of teacher education, and in the production and provision of science and mathematics teaching apparatus for schools and teachers' colleges.

27 AFRICAN REGIONAL WORKSHOP: SCIENCE EDUCATION AND THE AFRICAN CHILD

This workshop will be held at the Conference Centre, University of Lagos, Nigeria from 25th-30th August 1980. English will be the official working language.

This meeting will also be the Inaugural Conference of the Union of All Africa Science Teachers' Associations. Participation is open to all Science Teachers' Association in Africa.

Further details from:

The Administrative Secretary
Science Teachers' Association of Nigeria
P O Box 3395
Mapo-Ibadan
Nigeria

28 A SAMPLING OF THE PERIODICALS

The University of the West Indies in Trinidad has launched a series of *Annotated Bibliographies for Science Education*. Issue no. 1 (January 1980) contains 158 entries from 18 periodicals published in 9 countries (plus two international ones). The series editor is Judith Reay, who invites contributions from science educators everywhere. Details and a copy of the first issue, may be obtained from:

The Library
School of Education
UWI, St. Augustine
Trinidad

(please enclose US$2.00 to cover the cost of reprinting and airmail postage.)

29 NEWS FROM SIERRA LEONE

Interest in the education scene is active. Members of the Department of Education of Bristol University have visited to study in-service training, and Professor Peter Williams (Institute of Education, London) has studied teacher education at the secondary school level.

The teacher training unit at Bo has also received the benefit of specialist curriculum advice.

The third IDA loan will be mainly concerned with inputs to the primary sector and the initial review by the team of consultants has been completed. The particular interests are school mapping, teacher training, curriculum development and low cost materials.

The Integrated Science Curriculum has spread from the initial 20 pilot schools to more than 70 secondary schools and is receiving additional inputs of equipment with European Economic Community financial support.

Milton Margai College now has 500 students and intends to expand the English and Education Departments in the future. The training of business and technical teachers for secondary schools is prosecuted by a British team who have elaborated new courses in a purpose-built setting. This new unit is training a first group of students. The commercial courses are particularly popular and the project will hand over to Sierra Leonean tutors when their training overseas has been completed.

The European Development Fund will mount a third project in Sierra Leone concentrating on improvement for social, health and education services.

Professor Kose Thomas at Fourah Bay College is interested in appropriate technology and supervises a workshop which produces simple machines for local agriculture. The problems of mass production are partly resolved and the products, for example a palm-nut crusher are popular in the rural areas.

30 NEWS FROM THE GAMBIA

This African country is no exception in trying to modify gross shortages of trained manpower and material resources in the education section of public life.

The Gambia is still dependent upon overseas training for secondary school teachers and the present Gambia College with a modest trained primary teacher output will be hard pressed to fulfil the requirement for trained teachers when the primary enrolment rises by 50% in a few years time.

Building of a new teacher training complex at Brikama is well under way and should be completed early in 1981. Meanwhile, there is an intention to train technical teachers for secondary technical schools with local resources and the new college at Brikama will include nursing and agriculture departments.

The World Bank loan is now providing new schools, nurses centres, education centres and field stations. A second loan for assistance to the primary/non-formal sector of education may be ratified in the future.

The Science Teachers Association of Gambia has an active membership under its Chairman, Sam Njie. Members participate in curriculum development at the primary and secondary level and a newsheet is published for local circulation.

Andrew Jarvis, who now has a Ministry of Education responsibility, intends to produce a journal with the help of his colleagues in the Association.

The Book Production Unit has completed a busy initial year with over 200 leaflets, booklets and information sheets produced in printing runs of up to 500 copies. There are plans for expansion, masterminded by David Nicolas, and the staff display the right kind of versatility and adaptability which makes ventures like this a success. The unit is housed in a former private residence under the direction of Cotheo George and consists of duplicator and offset units with a collating machine, together with a

photographic room, store and graphics section. The unit cannot yet produce textbooks in quantity for schools (Macmillans will produce the primary science series) but provides a useful output of ancillary resource materials for teachers.

31 NEWS OF CANADIAN SCIENCE EDUCATION ACTIVITIES

1 An M.Ed programme (with emphasis on science) is beginning in September 1980 at The Faculty of Education, Queen's University, Kingston, Canada K7L 3N6.

2 The Science Teachers Association of Ontario have published a 'Catalogue of Curriculum Resourses' which is available from the Science Resource Centre of Queen's University Faculty of Education. It lists materials produced by teachers, and tested in the classroom, of interest to science teachers at every level in schools.

3 There will be a further 6 one-week chemistry demonstrations workshops in the summer of 1980, similar to those held at Queen's University in 1978 and '79. The workshop will give Chemistry teachers an opportunity to observe and try a variety of chemistry activities. Participants will leave opportunity to share their own experimental designs. Further information is available from Professor Irwin Talesnick at the Faculty of Education.

32 SIXTH INTERNATIONAL CONFERENCE ON CHEMICAL EDUCATION

The Sixth International Conference on Chemical Educatin will be co-sponsored by IUPAC and by the American Chemical Society. It will be held at the University of Maryland in August 1981. Further details are available from:

Professor Marjorie Gardner
Department of Chemistry
University of Maryland
College Park
Maryland 20742
USA

33 TWELFTH INTERNATIONAL CHEMISTRY OLYMPIAD: LINZ, AUSTRIA, JULY 1980

International Chemistry Olympiads are open for secondary school students of ages 16—18 years, who study in general secondary schools. Each country sends a team of 4 students, who are usually selected in national competitions, accompanied by 2 teachers.

The Olympiads consist of a theoretical and a practical part usually with a rest period between them. Five hours are allowed for solving the problems of each part. The questions are selected by a jury composed of the accompanying teachers, from a set drawn up by experts from the host country. The questions are translated into the participants' language.

Further information is available from:

Association of Austrian Chemists
Working Party on Chemical Education
Attention: Prof. Dr H Schindlbauer
Eschenbachgasse 9
A — 1010 Wien
Austria

34 EUROPEAN CONFERENCE ON ENVIRONMENTAL EDUCATION

The second conference on Environmental Education organised by the Institution of Environmental Sciences and the World Environment and Resources Council was held in Berne, Switzerland from 29 March to 2 April 1980.

This conference was attended by about 100 delegates from 22 countries as well as by representatives from international agencies such as UNESCO, UNEP, WHO and IUCN.

The conference was concerned with various aspects of international environmental education, with problems relating to Environmental Education for industry, for professional scientists, and for those involved in non-formal education as well as aspects of dissemination of information on environmental education. Among the plenary speakers were Professor Graham Ashworth CBE Chairman, Institution of Environmental Sciences and Dr Pierre Laconte, President, World Environment. Delegates from many countries presented discussion papers on the various themes of the meeting.

Although much of the discussion centred around aspects of conservation of the environment there were interesting papers on environmental education, for planners and urban managers. These were illustrated with examples from recent townplanning and institution development studies.

35 WORLD CONSEVATION STRATEGY

The World Conservation Strategy is intended to stimulate a more focused approach to the management of living resources and to provide policy guidance on how this can be carried out by three main groups:-

- Government Policy Makers and their Advisers;
- Conservationists and others directly concerned with living resources;
- Development Practitioners, including Development Agencies, Industry and Commerce, and Trade Unions;

The aim of the World Conservation Strategy is to achieve three main objectives of living resource conservation:-

(a) To maintain essential ecological processes and life-support systems (such as soil regeneration and protection, the recycling of nutrients, and the cleansing of waters), on which human survival and development depends;

(b) To preserve a genetic diversity (the range of genetic material found in the worlds organisms), on which depend the functioning of many of the above processes and life-support systems, the breeding programmes necessary for the protection and improve-

ment of cultivated plants, domesticated animals and micro-organisms, as well as much scientific and medical advance, technical innovation, and the security of the many industries that use living resources;

(c) To ensure the sustainable utilisation of the species and eco-systems (notably fish and other wildlife, forests and grazing lands), which support millions of rural communities as well as major industries.

This statement of policy and philosophy is based on the deliberations of the International Union for the Conservation of Nature and Natural Resources (IUCN).

36 ENERGY CRISIS AND ENVIRONMENTAL EDUCATION

The energy crisis has produced a deep change in the nature of contemporary society. It is necessary to consider whether there is a relatioship and, indeed, an interdependence between the aims and objectives of education and any model of modern society.

However, one of the fundamental purposes of education is to serve the needs of society, and if we accept that society itself is changing as a result of the energy crisis, then indeed the aim and objectives of science education must themselves change. It is felt to be important to ensure that people understand the scientific concepts which lie behind the extraction of energy and the alternative sources of energy.... Indeed it has been suggested that there should be a new educational goal which has been termed 'scientific-alphabetisation'. It has been said that an understanding of the nature of energy and the related problems is a social need induced by the energy crisis. Therefore, the energy crisis has introduced a fundamental questioning of the traditional meaning of science teaching, and there is a strong development in the research which is planning a renewal of the aims and objectives of a scientific education.

In general terms, the main goal of the majority of contemporary educational researches in this area is directed towards a study of the relationship between scientific knowledge and the needs of the developing society. We must, for example, take into account the possibility of teaching science beyond the traditional ways organised in the specialisms of chemistry, physics and biology. Indeed, it has been suggested that the over-specialised disciplines seem to be incapable of making most people aware of the problems of our society.

Our research group in science education at the University of Florence is working on the problem of a fundamental 'Energy Environmental Education' (problem focused E.E.E. Project) because we feel that this will help to formulate a new relationship between the structure of science and environmental studies on the one hand and the needs of society on the other.

For an exchange of opinions on this subject and for extending international co-operation on this subject, please write to:

Dr Paolo Manzelli
Co-ordinator of Problem-Focused E.E.E. Project;
Chemical Physics Institute
University of Florence
via G Capponi 9
50121 Florence
Italy.

37 UNESCO: BIOLOGY EDUCATION PROGRAMME FOR AFRICA

It is proposed to develop a teachers' source book on innovative techniques for the learning-teaching of Biology, taking into account the needs of rural areas of Africa, as part of the UNESCO Biology education programme for 1979—1980.

Enquiries to:

Dr F C Vohra
Division of Science Technical and Vocational Education
UNESCO
7 Place de Fontenoy
75700 Paris
France

38 INTERNATIONAL MATHEMATICAL OLYMPIAD (SEN 41: 17)

There are no plans to hold an IMO in 1980, although it is expected that there will be one in 1981.

There are plans for two sub-regional competitions in 1980. Finland is hosting one, on the lines of a mini—IMO from June 29th to July 5th; it is expected that Hungary, Sweden and possibly Britain will participate. Luxembourg is the suggested venue for a 'Western European' competition, probably in late July in which Belgium, Britain, Holland and West Germany are expected to take part.

39 MATHEMATICS COMPETITIONS IN MALAYSIA

The Malaysian Mathematical Society is organising the following yearly competitions at about 22 centres throughout Malaysia, including Sabah and Sarawak on 3 May, 1980.

(a) Sixth Malaysian Olympiad for Form 4 and Form 5 pupils;

(b) Eighth National Mathematics Competition for Form 6 pupils.

The competition is for pupils enrolled in Malaysian schools and is based on a 3-hour written paper, with objective type of questions for the Olympiad.

Entries are invited both on individual and team basis. Each school may enter a team of not more than four students and the team prize is awarded on the performance of the best three members.

Among the prizes is the IBM challenge Trophy for the best individuals and the Lee Foundation Challenge Plate and the Sabah Foundation Challenge Shield for the top teams.

Further information is available from:

The Mathematics Competition Organising Committee
Malaysian Mathematical Society
c/o Pusat Pengajian Sains Mathematik
Universiti Sains Malaysia
Pulau Pinang
MALAYSIA.

40 1979 AUSTRALIAN MATHEMATICS COMPETITION FOR THE WALES AWARDS

The organising committee has published Solutions and Statistics for the 1979 competition which attracted 100,000 participants. The book is for use by students, teachers and anyone interested in mathematics. The questions (and some answers) are arranged in Junior, Intermediate and Senior divisions. The competition, now in its 3rd year, aims to stimulate interest in school mathematics and to encourage young Australians to strive for excellence in the subject. Participation is growing and next year the competition will be opened to visually handicapped students; it is also planned to invite schools in New Zealand and other parts of Oceania to take part. As well as presenting an informative record of the competition the booklet should be a useful source book for teachers and revision book for students. The booklet is published by:

The Canberra College of Advanced Education
PO Box 1
Belconnen
A.C.T. 216
Australia.

41 FIJI MATHEMATICS ASSOCIATION

The Fiji Mathematics Association (FMA) was revived two years ago and the report of its annual conference in August 1979 has been published. Readers in countries where the formation of a Mathematics Association is being considered are recommended to acquire a copy as it contains a very good description of the ways in which such associations can be of help in the development of mathematics education. Write to:

Peter Sanders
School of Education
University of the South Pacific
Box 1168
Suva
Fiji

42 THE GAMBIA MATHEMATICS TEACHERS' ASSOCIATION

The annual report for 1978/79 lists the Association's activities as:

1 Weekly meetings at the Curriculum Development Centre on Saturday mornings to assist with the writing of the new syllabuses. The Primary One Workbook and Teacher's Handbook is now printed and in use in schools. Primary Two is in process of being rewritten and Primary Three in Draft form is being tested in the pilot schools.

2 A seminar/workshop held at Easter to introduce teachers to topics in Primary One — Three.

3 Publication of a members' journal 'Veetor' which appears twice a year.

43 THIRD WORLD CONFERENCE ON COMPUTERS IN EDUCATION

This conference is being held in Lausanne, Switzerland from 27—31 July 1981 and organised by the Swiss Federation of Automatic Control.

Subjects to be considered are:

1 Information science (often now called 'informatics'); mathematics — natural sciences — liberal arts — social and behavioural sciences — management — engineering — administration;

2 Instructional techniques; computer-aided learning — computer managed instruction — mass education;

(3) The impact of new technologies; microcomputers — videodiscs — home computers — networks — future trends;

(4) Social impacts; the changing role of teachers in education;

(5) Reviews of national policies and models of computer education; with special emphasis on the needs of developing countries;

(6) Aims, policies and curricula for information science education.

The organisers are now inviting authors to submit papers for the conference on any one of these subjects; they point out that papers on other subjects, provided they are encompassed by the conference title may be offered. Each subject can be aimed at any level, from primary to university education. Readers wishing to submit papers or wishing to obtain more information about the conference should write to:

M Bernard Levrat
Chairman of Programme Committee
Université de Genève
Centre Universitaire d'Informatique
24 rue de Général-Dufour
1211 Genève 4
SWITZERLAND